SAFETY IN THE AIR

by

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Sept. 17
1958

SAFETY IN THE AIR

GIANT JET TRANSPORTS, scheduled to go into coast-to-coast service next January, will traverse a congested airspace regulated by an air traffic control system that has not yet caught up with the meteoric rise in aviation activity. Establishment of the Federal Aviation Agency, under an act approved Aug. 23, is expected to promote air safety in the dawning era of commercial jet flying. But considering the tremendous growth still expected in commercial, private, and military air traffic, extraordinary efforts will be needed to prevent increases in air disasters, particularly from midair collisions. Stuart G. Tipton, president of the Air Transport Association of America, said on May 29: "The American airspace has rapidly become a vanishing natural resource insofar as free access and capacity for safe operation of aircraft is concerned." Speedy jet planes disproportionately shrink available airspace.

The irony of the serious air safety problems now confronting the nation is that they stem largely from traffic expansion that has been fostered by past achievements in making it safer to fly. Public confidence in air transportation has soared with steady improvement in the safety record of American aviation. Fewer than 1.2 million passengers were carried on scheduled domestic airlines in 1938. The annual total had risen to 12.2 million by 1946, to 17.6 million by 1950. Last year nearly 45 million passengers rode the scheduled domestic airlines.

These 45 million passengers were flown over 26 billion passenger-miles. While the number of passengers was more than 35 times greater than in 1938—and the number of passenger-miles about 50 times greater—the passenger fatality rate was only 1/45 of the rate 20 years earlier. Scheduled domestic airlines averaged 2.2 fatalities per 100 million passenger-miles for the five-year period ended in 1947; the average fell to 1.05 fatalities for the five years ended in 1952 and dropped to an all-time low of 0.41 for the

five years from 1953 through 1957.[1] James R. Durfee, chairman of the Civil Aeronautics Board, told a Houston audience on July 3 that:

> In 20 years—from a time when air transportation was widely considered to be a risky thrill—air transportation in this country has become far safer than auto travel for your inter-city trip—statistically it is 20 times safer according to 1957 figures. The same 1957 statistics also showed airline travel to be safer than bus travel—and only the railroads showed a slightly better record, due to a remarkable drop in railroad fatalities during 1957.

The huge growth in common carrier air travel accounts for only a part of the postwar boom in sky traffic. Popularity of recreational flying and acquisition of fleets of planes by business companies for executive travel have boosted the number of privately owned aircraft from 10,000 before World War II to almost 67,000 today. More significant from a safety standpoint, the country's 37,000 military aircraft include many thousands of jet planes. Military jets fly two, three, or four times as fast as their piston-powered predecessors and thus cover during a given period two, three, or four times as much airspace.

Advent of Jet Transports; Air Congestion

The airspace now seems destined for more crowding as the country's commercial airlines prepare to change over to jet propulsion. Pan American Airways plans to institute transatlantic commercial jet service between New York and Paris on Oct. 26, using the Boeing 707. American Airlines will use the same type of plane when it pioneers transcontinental jet service, between New York and Los Angeles, early in January. Inauguration of both services may be delayed by failure so far of the fully loaded 707 to meet noise standards set by the Port of New York Authority at that city's airports.[2] However, work on an improved "muffler" for screeching jet engines is proceeding and no one expects the start of jet flights to be held up for long, if at all.

The Boeing 707 is the first of three American-made jet transports being readied for regular service. First deliv-

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[1] The fatality rate for American flag carriers in scheduled overseas flights was even lower than that for domestic carriers during the latest five-year period.

[2] Austin J. Tobin, executive director of the Port of New York Authority, recently wrote Western European airport operators that both Pan American and American "recognize and accept the fact that there is serious doubt as to whether or not the fully-loaded 707's can operate from New York International (Idlewild) except under very severe operating limitations." Quoted by *Wall Street Journal*, Aug. 29, 1958.

eries of the Douglas DC-8 are scheduled for late in 1959, of the Convair 880 for 1960. All three planes are designed to carry at least twice as many passengers, at speeds nearly twice as great, as today's most widely used distance plane, the DC-7. The standard cruising speed of the Boeing airliner will be 585 miles an hour, contrasted with the DC-7's 385 miles an hour. While the DC-7 is designed to carry 60 passengers, the 707 has movable bulkheads that will make it possible to vary seating capacity from 100 to 165.

More than 80 Boeing 707 and DC-8 jets will have been delivered to seven of the country's airlines by the end of next year. Orders for jet transports for later delivery are constantly increasing. Compilations by the Air Transport Association showed, Sept. 3, that 18 American airlines were scheduled to take delivery of 291 of the planes by the end of 1961. The approaching dominance of jet-powered aircraft in airline fleets is further evidenced by plans of American air carriers to retire at least 525 of their 1,800 piston-powered planes by the end of 1961. The retired planes will be replaced by pure jets and by at least 175 jet-prop aircraft similar to the British-made Vickers Viscount now employed in this country for middle-distance flights by Capital Airlines.[3]

C.A.B. Chairman Durfee referred last July 3, half a year before domestic air travel by jet planes was to begin, to the airspace congestion "brought on by the tremendous growth in the number and speed of both military and civil aircraft—a congestion that has been tragically underscored by recent accidents." The great speed of jet planes is a potential accident factor, for it drastically reduces the time left in which to avoid collision after sighting another plane in the jet's path. A jet transport pilot who spotted an oncoming plane traveling at half his speed a mile away would be on the other in about four seconds. Rep. Joe M. Kilgore (D-Texas) asserted on May 22[4] that "Certainly a very serious question is raised as to whether this [collision] problem should be aggravated by the introduction of com-

[3] Two American jet-prop planes have been certified by the Civil Aeronautics Administration—the Lockheed Electra and the Fairchild F-27. Eastern Air Lines will begin scheduled service with the Electra, Dec. 1, on its New York-Miami and Montreal-Newark-Washington runs. Jet and jet-prop engines both develop power by burning a mixture of fuel and compressed air in a central combustion chamber. The jet plane is propelled by the kick of the exploded mixture roaring out the tail pipe; in the jet-prop the powerful exhaust turns a turbine connected with a propeller.

[4] At hearings of a House Government Operations subcommittee to gather information for the committee's annual report on the federal government's role in aviation.

mercial jet airliners which travel at speeds in excess of 500 miles per hour."

Recent Midair Collisions and Near Misses

Airliners figured in two of ten midair collisions in which civil aircraft were involved during the first eight months of 1958. A United Air Lines DC-7 and an Air Force F-100F jet trainer rammed almost head-on at 21,000 feet near Las Vegas, Nev., April 21, killing 42 passengers and all seven crew members of the two planes. Less than a month later, on May 18, a Baltimore-bound Capital Airlines Viscount and a Maryland Air National Guard T-33 jet trainer collided 8,000 feet over Brunswick, Md., bringing death to the 11 persons aboard the Viscount and one of two persons in the T-33. The pilot of the trainer, who parachuted to safety, later said he had not seen the other plane and did not know the accident was caused by collision until so informed at the hospital.

The day before the Brunswick disaster, the Civil Aeronautics Board had released a ten-year resume of midair collisions in United States civil flying and a report on near misses in 1957. The resume showed that in the 1948-57 decade there were 159 collisions; clear weather, good visibility, and daylight prevailed in approximately 95 per cent of the cases. Seventy-seven of the collisions involved fatal injuries to a total of 402 persons; the largest loss of life occurred when 128 persons perished in the collision of two airliners over the Grand Canyon on June 30, 1956.

Only 16 of the 159 midair accidents involved airliners, and no passengers were aboard on four of those occasions. In 152 of the 159 collisions, at least one private plane was involved, and 119 of the collisions involved private planes exclusively. A military plane figured in 24 of the accidents. Available C.A.B. figures, supplemented by conservative estimates, indicate that no more than one passenger-carrying airline flight in 3.8 million was involved in a midair collision from the beginning of 1948 to mid-September 1958.

Statistics show no upward trend in collisions, but there is considerable fear that many near misses, like the 971 reported by the Civil Aeronautics Board for 1957, may turn into direct hits as military and civilian jet operations expand. The C.A.B. strongly implied in its recent study that the average of 2.7 close calls a day shown by reports

for the year 1957 may in actuality have been three times as great.[5]

Measures to Protect Air Travelers

A DETERMINED ASSAULT on the safety problems resulting from growing congestion of the airways has been in progress for more than two years. New rules have been promulgated; the tempo of research has picked up; funds for modernizing safety facilities have been appropriated; and a new and powerful federal agency, designed to put an end to haggling and confusion, has been authorized by Congress. The collisions this year have spurred enlargement and intensification of the safety campaign that got started following the Grand Canyon disaster in 1956. Meanwhile, the new jet airliners have been painstakingly designed to eliminate accident hazards.

Extent of Air Traffic Control Facilities

Government leaders and top officials in military and commercial aviation agree that the ultimate solution of the congestion problem lies in "positive control" of air traffic—"a control system that will enable a traffic cop on the ground to insure traffic separation in the air with a host of electronic tools." [6] The purpose of the air traffic control system is to keep aircraft flying on instruments safely separated in the air. It relies heavily now on calculations made in the Civil Aeronautics Administration's 26 air traffic control centers by technicians who keep in touch by direct radio contact, and in some instances by radar, with the progress of planes under their supervision.

Complete positive control of air traffic would require all planes to adhere to Instrument Flight Rules (I.F.R.), whether the weather was good or bad. At present, less than ten per cent of all flying takes place under direction of C.A.A. traffic controllers under I.F.R. procedures. Ninety

[5] Beginning in May 1956, C.A.B. asked pilots of civil and military planes to report near misses on a voluntary basis. During the first four months (May-August 1956) the reports showed 1,240 clearly established near misses. In explanation of the smaller number for the whole of 1957, the board said on May 19, 1958: "The characteristic or normal curve for this type of survey shows a high frequency of participation in the initial period and then a rapid drop-off."

[6] James R. Durfee, speech on July 3, 1958.

per cent of the flying is done under Visual Flight Rules (V.F.R.), where only the "see and be seen" or "see and avoid" rule applies. No two planes conforming to Instrument Flight Rules have ever collided. The airliners involved in the Las Vegas and Brunswick collisions were both traveling in this manner, but they were not protected against collision with planes not under such control.[7] The military jets involved were flying under Visual Flight Rules.

If the federal government were to insist upon complete positive control today, 85 per cent of air traffic would automatically be grounded. The C.A.A. air traffic control system currently handles about 17,000 instrument flights a day, compared to 10,000 two years ago. However, approximately 50,000 point-to-point flights are included in the 200,000 flights now made every day in the United States.

Rules for Superskyways and Other Areas

In the absence of complete positive control of airspace, civil and military aviation authorities, and the owners and pilots of common carrier and private planes, have attempted to work out rules and agreements for assuring maximum safety with the facilities currently available. The C.A.A. on June 15 began operating three "superskyways," 40 miles wide, in the airspace between 17,000 and 22,000 feet above sea level.[8] Establishment of the superskyways marked the first time that complete positive control had been applied to all civil and military aircraft along a designated transcontinental air route. Each flight is conducted in a "cocoon" of its own airspace, protected by ground monitoring that keeps aircraft separated 1,000 feet vertically and 10 miles' flying time horizontally. No aircraft flying under the "see and be seen" rule may enter or cross any one of these corridors without specific clearance from C.A.A.

Airline pilots and companies have long been committed to chief reliance upon I.F.R. procedures as rapidly as the capacity of the air traffic control system would permit. A year ago last May the Air Line Pilots Association joined the airlines in an agreement to fly by positive control on all airways in the country above 18,000 feet. The same rule

[7] I.F.R. procedures require a pilot to submit a flight plan to the appropriate C.A.A. station for clearance before taking off, to keep in touch with ground controllers at "fix points," and to get permission before making any modifications in the flight plan. See "Jet Age Problems," *E.R.R.*, 1956 Vol. I, pp. 379-381.

[8] The superskyways run between New York and San Francisco, New York and Los Angeles, and Washington and Chicago.

was to be observed above 9,500 feet in the so-called "Golden Triangle" embracing the busy area between New York, Chicago, and Washington.

The 18,000-foot minimum was lowered by the airlines and pilots to 10,000 feet on July 1 of this year. On the same day the Civil Aeronautics Administration gave tacit approval to this voluntary action by announcing that any plane taking off under an I.F.R. flight plan would not be asked by traffic controllers to switch to Visual Flight Rules, even if flying conditions were perfect.

Airline pilots still have to keep a lookout for any planes flying V.F.R. A Civil Aeronautics Board regulation that took effect Aug. 15 is designed to provide automatic 500-foot separation between V.F.R. and I.F.R. flights. Aircraft flying under an instrument plan will cruise at straight thousand-foot levels, while planes employing the "see and be seen" rule will cruise at thousand-foot levels plus 500 feet.[9] C.A.B. in October 1957 designated the entire airspace above 24,000 feet as the "continental control area." This does not mean that V.F.R. craft must keep out of the area unless they have C.A.A. clearance, but it does mean that any pilot flying a civil or military plane will automatically be entitled to an instrument flight plan if he wants it. The "continental control area" is expected to be lowered to 15,000 feet as soon as adequate ground facilities are available.

The accident hazard around highly congested airports prompted C.A.B., in February 1957, to authorize C.A.A. to designate high density air traffic zones, with strict speed limits and communication rules. An arrival and departure "terminal area advisory service" is currently being put to test in the Indianapolis terminal area. All pilots within range of the airport's surveillance radar are offered air traffic information affecting their safety. James T. Pyle, Civil Aeronautics Administrator, said on July 12 that "So far the test has proven highly successful." Pointing out that the new service was voluntary, Pyle commented: "Once all pilots become aware of the greatly added safety the service gives them, I am sure it will become highly popular." He indicated that the advisory service might soon be extended "to all areas that have the proper radar equipment."

[9] Federal airways are "two-way," and whether the thousand-foot level is odd or even depends upon the direction.

NEW REGULATIONS GOVERNING MILITARY FLYING

The military services, like the airlines, have taken steps to promote safe flying that go beyond those imposed on all aviation by federal civil authorities. Virtually all aircraft testing today is conducted over open water or sparsely populated areas. Experiments conducted by the Air Force Training Command to reduce the collision hazard by painting the tail and nose sections of its planes with a blaze-orange fluorescent paint have proved a spectacular success. It was announced July 14 that since January 1958, when most of the 13,000 non-tactical Air Force craft had been so painted, there had been no midair collisions at training bases as a result of failure to see or be seen. By contrast, there were nine collisions at training bases in the preceding 12 months, and seven in the year before that. A C.A.A. spokesman said, Sept. 12, that that agency had painted its planes in a new design of blaze orange with black borders.

Two days after the Brunswick disaster in May of this year, the President's aviation aide, Lieut. Gen. Elwood R. Quesada, disclosed that the armed services had offered to put military aircraft under more severe restrictions than required by federal air regulations. All non-tactical jet flights were to be made under Instrument Flying Rules, beginning May 24, if the flight plan called for a cruising altitude below 20,000 feet in an area encroaching on a designated federal airway. Principally affected by the new restrictions were training flights, like those involved in the Las Vegas and Brunswick collisions.

Less than a month later, the Air Force was forced to backtrack on application of the new order in the vicinity of Washington, D. C. Maj. Gen. Reuben C. Hood of Headquarters Command granted permission to climb on a "see and be seen" basis to assigned altitudes whenever take-off would be delayed more than one hour by waiting for C.A.A. clearance; once up, planes would fly under instrument flight rules. A 66 per cent cutback in operations had developed in the Washington area after all Air Force flights, other than defense missions, had been placed under C.A.A. ground control.

The Washington experience was apparently symptomatic of a national jam-up. The Civil Aeronautics Administration said, June 26, that the military demand for instrument flight plans, "coupled with the airline plan to use I.F.R.

service on all flights above 10,000 feet [which was to take effect five days later] . . . would have imposed a demand on the system that could not have been accepted under present capacity without severe delays to all users of the airspace." It therefore requested the military "to defer maximum use" of instrument flight rules when climbing or descending and to put an end to a provision of the new military safety program "requiring full en route I.F.R. operations by conventional aircraft below 10,000 feet."

Safety Features of the Jet Air Transports

Most of the air safety rules recently imposed by the government or voluntarily adopted have been geared to meeting problems produced by congestion of the airspace. There are two fundamental reasons for this: First, essentially the same equipment and traffic rules that are needed to reduce the collision danger are needed to eliminate the traffic jams and long delays which each year cost the airlines millions of dollars and cause endless discomfort and inconvenience to passengers, pilots, and the military services.[10] Second, the collision danger is one that electronics experts have not been able to remove by developing an airborne anti-collision device.

The new jet transports have been designed, equipped, and pre-tested with the intention of eliminating virtually all other causes of aircraft disaster, to the extent that human ingenuity allows. Painstaking attention has been given to cutting down chances of human error. The Boeing 707 has 115 fewer power-plant controls and displays than the Boeing Stratocruiser of 1939. Operational simplicity means less likelihood of disasters that stem from pilot or crew fatigue (a leading contributor to accidents at the end of a flight) and less likelihood of "forgetting errors" (cause of a number of serious accidents at the take-off).

Although in-flight engine fire has always been less of a threat in jet than in piston planes, the fire hazard has been further reduced in the new commercial jets. Engines will be mounted in pods beneath the wings, not built into the wings. This will isolate engine fires from the rest of the plane. In the event of take-off crash, fire extinguishers

[10] J. D. Smith, chairman of the Air Line Pilots Association's air traffic control committee, said on May 13: "While the airline industry as a whole had approximately a $25 million profit last year, it is estimated an equal amount was lost because of air traffic control and airport deficiencies."

will automatically douse the engines, and a system of more and bigger emergency doors will allow swift egress from the aircraft.

American jets have been designed to avoid the troubles of Britain's de Haviland Comet, the jet airliner taken off the airways in 1954 after three had exploded in mid-air.[11] The Comet was found to have suffered metal fatigue caused by rapid pressurization and depressurization in swift ascents and descents—like bending a piece of metal back and forth until it breaks. The American transports have been structurally reinforced to prevent such disaster. By way of further precaution, a special construction feature, variously called "fail-safe," "multi-member," and "multi-path," is supposed to permit complete fracture of the skin panel in any section of the fuselage without producing the decompression explosion that was responsible for the Comet crashes.[12]

In addition to being protected by these and many other safety "firsts," the giant airliners will have the safety factors characteristic of jet craft. Jet engines are generally considered more reliable. Jets can fly higher than piston engine planes, avoiding bad weather with ease, and their sweptback wings are less affected by turbulence. At altitudes of 24,000 feet and above, they will be using airspace hitherto occupied almost exclusively by military traffic. Efforts have been made to reduce the danger of collision by designing the cockpits to permit vision straight up, almost straight down, and straight back on either side to an angle of 20 degrees. The airliners would be safer still, it is agreed, if some type of proximity warning system were available to notify the pilot of potentially dangerous traffic and automatically change the plane's course.[13] Years of research have not yet turned up an efficient anti-collision device. But as one aviation editor recently observed: "Every day that passes without an acceptable proximity warning system makes such a system less worth while. For, in three to six years, the combined efforts of the Airways Modernization Board and the Civil Aeronautics Ad-

[11] A corrected model, Comet IV, is to be put in service by the British Overseas Airways Corporation on Dec. 1. The new Comet is expected to be the chief rival of the American jet airliners.

[12] The structural integrity of the Boeing 707 was successfully checked by the "guillotine test," in which it was found that a crack 30 inches deep could be made anywhere in the fuselage without causing decompression explosion.

[13] Gen. Quesada said in a copyrighted interview in *U.S. News & World Report*, July 18, 1958, that "Most of the radars in commercial airplanes are for weather surveillance, and it would be an extremely alert observer who could pick up a target represented by an airplane on that type of radar."

ministration will have brought about a radical improvement in the ground-based separation system." [14]

Developments in Federal Regulation

RESPONSIBILITY for development of air safety devices has rested, since Aug. 14 a year ago, with the Airways Modernization Board, headed by the President's aviation adviser, Gen. Quesada. The idea for such a board came from the study which recommended creation of the Federal Aviation Agency. Edward P. Curtis, former assistant to the President for aviation facilities planning, submitted an ambitious plan on May 10, 1957, to correct technological and organizational deficiencies in the air traffic control system. The Curtis plan called for creation of the Airways Modernization Board as a temporary independent agency to be absorbed later by a permanent agency that would take over the duties of numerous existing boards and committees. President Eisenhower said of the A.M.B. in a special message to Congress on June 13, 1958:

> Except for certain facilities so peculiar to the operations of the Armed Forces as to have little or no effect on the common system, all air traffic control facilities are now developed by the Airways Modernization Board. The duplication and conflict between military and civil air facilities research agencies, which have proved so costly in the past, have been eliminated by the partnership which characterizes this new agency.

The President explained that he had intended to submit recommendations for a Federal Aviation Agency "early in the next [1959] session," but that "the recent Maryland collision has made it apparent . . . that the need for action is so urgent that the consolidation should be undertaken now." Three weeks earlier a bipartisan group of 34 senators, led by A. S. Mike Monroney (D-Okla.), chairman of the Senate Commerce Committee's aviation subcommittee, had co-sponsored a bill similar to that urged by the President, and an identical bill was offered in the House. This legislation, only slightly modified on its way through Congress, provided the statutory authority for creation of the Federal Aviation Agency.

[14] William G. Osmun, "The Midair Collision 'Problem'," *Business/Commercial Aviation*, July 1956, p. 24.

LONG LACK OF UNIFIED REGULATORY AUTHORITY

The act approved Aug. 23, which is not expected to be in full operation for another year, is designed to correct "two fundamental deficiencies" that are closely related. These were defined in the Senate committee report on the bill as "diffusion of authority" and "lack of clear statutory authority for centralized air space management." Divided authority was implicit in the first basic federal aviation statute, the Air Commerce Act of 1926. That law assigned regulation of air commerce to the Secretary of Commerce; empowered the President to set up airspace "reservations" for defense or other governmental purposes; and authorized the Secretary of War to designate military airways.

Congress in 1938 recognized need for a unified, independent agency by setting up the Civil Aeronautics Authority, composed of a five-member board, an administrator, and a semi-autonomous Air Safety Board to investigate accidents. However, the agency established by the Civil Aeronautics Act of 1938 had hardly come into existence when it was split into separate rule-making and administrative bodies by (presidential) Reorganization Plans III and IV of 1940. The Air Safety Board was abolished and the five-member policy-making board was renamed the Civil Aeronautics Board and made responsible for laying down safety rules, for economic regulation of the airlines, and for accident investigation. The administrative wing of the Civil Aeronautics Authority was placed within the Department of Commerce as the Civil Aeronautics Administration and assigned responsibility for day-to-day management of the skyways. The confusion resulting from divided authority was compounded when Congress in 1948 let C.A.B. delegate rule-making functions to C.A.A.

Uncertain lines of authority made it difficult to settle conflicts between the interests of military and civil aviation. As an example, civilian and military authorities went separate ways in developing the nation-wide system of short-range air navigation and traffic-control aids that Congress recommended, in 1947, for joint use by civil and military aviation. Not until August 1956, after costly elements of the separate systems had been almost completely installed, was a common system agreed upon.

Theoretically, civil authorities have had full control over utilization of airspace, except on "air reservations" as-

signed to the military for training, testing, weapon development, and other purposes.[15] Disagreement over what portions of space should be allocated to the military prompted the Executive Branch to establish the Air Coordinating Committee in 1946. The House Commerce Committee observed in a recent report:

> Under this system, airspace has been assigned on a case-by-case basis, often resulting in delays and patchwork solutions to many critical airspace problems. For example, this committee, in its investigation of the Grand Canyon accident, found that establishment of an airway over the heavily traveled route over Grand Canyon was being delayed by objections of the military made through an Air Coordinating Committee panel.

A Civil Aeronautics Board regulation that took effect April 1 gave the Civil Aeronautics Administration authority to set restrictions on airspace utilization and specified that military aircraft might deviate from common air traffic rules only when non-compliance was "required by military emergency or current military necessity essential to the defense of the U.S." Such deviation, it was explained, would require prior notice to C.A.A.[16] This grant of authority was not sufficient, or had not been in force long enough, to prevent the Las Vegas and Brunswick collisions that followed shortly thereafter. The Las Vegas accident led to a public debate between C.A.B. and C.A.A. over ultimate blame for the crash.[17]

Analyzing the Las Vegas disaster in its report on Aug. 19, C.A.B. cited the high rate of closing speed between the airliner and the Air Force training jet, and human and cockpit limitations on visibility, as probable causes of the accident. However, it took C.A.A. to task for having authorized daily training flights out of Nellis Air Force Base, near Las Vegas. The Civil Aeronautics Administrator had been remiss, the report contended, for not notifying C.A.B. of the safety hazard in the Nellis area. Even after United Air Lines had complained of near misses there, C.A.A. took "no action of any kind," the report said.

C.A.A. Administrator Pyle insisted two days later that C.A.B. and the Air Force shared equally in responsibility for the accident. Pyle said his agency lacked authority to

[15] Some 218 areas, comprising about 3 per cent of the total national airspace, are designated as "prohibited" or "restricted" areas and barred to regular civil and military aircraft. Such areas include artillery, bombing, and missile ranges, aircraft testing areas, atomic energy installations, etc.

[16] Previous regulations had not specified the conditions under which military aircraft would be allowed to deviate from air traffic rules.

[17] The C.A.B. report on the Brunswick, Md., crash has not yet been released.

control the jet because it was flying under Visual Flight Rules. He contended that C.A.A.'s "inability to act effectively arose out of the same basic conflict between users [of airspace] which induced the [Civil Aeronautics] Board not to take regulatory action which might have contributed to prevent" the Las Vegas collision. That "basic conflict," he explained, was the desire of military jets and commercial airliners to fly the same routes.

Provisions of Federal Aviation Act of 1958

The Federal Aviation Act of 1958 represents an attempt to eliminate the confusion that has delayed development of modern facilities and stood in the way of decisions which might have prevented some accidents and which are needed more than ever now if jet air travel is not to be marked by recurring tragedy. All of the present duties of the Civil Aeronautics Administration and the Airways Modernization Board, together with the rule-making functions of the Civil Aeronautics Board, are to become the responsibility of the independent Federal Aviation Agency. F.A.A. will have responsibility for development of short-range and long-range national policy on airspace use; for regulation of airspace use by both civil and military aircraft; for establishment and operation of air navigation and traffic control facilities and for development of those facilities.

Regulatory powers over civil and military aviation will be in the hands of a civilian administrator appointed by the President with consent of the Senate.[18] The administrator will have authority to allocate airspace and to make and enforce air traffic rules;[19] direct military and civilian aviation research; and control the location and runway layout of civil airports aided by federal funds.[20]

Substantial military participation in F.A.A. was authorized in order to avoid duplication in safety research and make certain that traffic rules and airspace allocations meet the needs of national defense as well as promote the convenience and safety of civil aviation.

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[18] The deputy administrator, named in the same way, may be a military officer, unless the administrator was formerly a regular military man. Both must have had prior experience in aviation.

[19] Authority to investigate accidents and determine probable cause will remain with C.A.B. in order to avoid placing responsibility for accident investigation on the same agency that makes the safety rules. The board will also retain its authority to allocate airline routes and pass on fare increases.

[20] The F.A.A. administrator is to be consulted on location of military airports and missile sites. In the event of disagreement with the Defense Department, the President will have the final word.

Sixty days after the administrator and his deputy have taken office, the preliminary plans already under way to carry out extensive personnel transfers and reassignments can be executed. Government aviation leaders have indicated that once the working staff has been assembled, top priority will be given to hastening development of improved air traffic control procedures.

PLANS FOR UPDATING OF AIR TRAFFIC CONTROLS

Gen. Quesada, chairman of the Airways Modernization Board, told *U.S. News & World Report* on July 23 that it was "going to be five years before we can provide positive separation for those aircraft equipped for and desiring it." He noted that the benefits of budget increases of the last few years were only now beginning to accrue. C.A.A. Administrator Pyle, testifying May 23 before a House subcommittee, said the reason for present inadequate capacity for instrument flying was apparent.

> The C.A.A. program for the establishment of air navigation facilities in 1955 was slightly over $3 million; in 1956, this program was increased to $23 million. Out of public awareness which the Grand Canyon tragedy aroused, the program . . . was again increased, this time to $75 million; still further increases were effected in 1958, when the program exceeded $146 million. The total . . . authorized for 1959 is $175 million.

The Federal Aviation Agency will inherit limitations in "three general areas," which Pyle said would prevent immediate expansion of flying under the Instrument Flight Rules system. First, necessary radar equipment is lacking, particularly long-range radar.[21] At least 100 radars with a range of around 150 miles will be needed "to blanket the country," and under present plans this number will not be in operation until 1963. In the meantime, when a ground controller does not have a graphic picture before him of all traffic within a 150-mile radius, he will have to rely on piecemeal radio contact to keep planes separated. So far, long-range radars have been installed at only five places (Chicago, Indianapolis, New York, Norfolk, Washington), but 40 installations are scheduled to be operating by July of next year. Short-range radar will have to be placed at more airports, if those airports are to handle increased traffic safely and efficiently. Airport surveillance radar,

[21] Pyle said July 12: "The most useful tool our traffic controllers have is radar. With radar we can handle up to three times the volume of traffic we are able to control without it. As our new radars are emplaced and come into operation, our over-all capability of controlling traffic will show a steady increase."

which detects craft within 50 or 60 miles of an airport and expedites the flow of traffic, are in operation at 46 airports today and are scheduled for installation at 189 within the next five years.

A second need before positive control of the airways can be made complete is for an automatic or semi-automatic system to process information on air traffic received by radio or radar. When perfected, probably by 1963, new devices will take over from the present system which employs manual methods dating back to the beginning of the DC-3 era in the 1930s. The heart of the new set-up will be an electronic computer that will free ground controllers from routine calculations and allow them to concentrate on observation of plane movement. A third requirement is for highly trained personnel to man the new radar and communications equipment; it takes two years to train an electronics specialist for traffic control duty.

Opposing Views on Air Safety Requirements

Symptomatic of the conflicting points of view on causes and solutions of air safety problems has been the opposition of the Aircraft Owners and Pilots Association to stress on positive control of all flying. This organization speaks for "general aviation," which includes all civil flying except that of the airlines and the C.A.A. itself; last year the planes concerned flew 10.5 million aircraft-hours, compared to 7.5 million by Air Force planes and 3.6 million by airline transports.

The A.O.P.A. contends that there is nothing basically wrong with "see and be seen" flying if pilots will only watch where they are going. Referring to the "panic" caused "by recent military jet collisions with civilian aircraft," J. E. Hartranft, Jr., president of A.O.P.A., said on May 29: "It must be self-evident to most thinking Americans that if some group wanted to shoot guns in Times Square, the answer is not to pass a law banning the public's use of the thoroughfare or a frantic mandate making it unlawful to walk the public streets without wearing bullet-proof vests."

The nine-point safety program of the organization, which represents over one-half of the country's aircraft, would impose tight restrictions on military jet operations; reduce speed limits in all civil airport traffic patterns;

make easily visible color schemes mandatory for all civil aircraft; and raise minimum safe standards for cockpit visibility. But Administrator Pyle insisted in a speech on July 12 that "Positive control of some nature will have to be eventually extended" to flying by private pilots in "high density areas." He added: "Our first consideration is . . . safety for all users of the airspace. Our second is to assure that no user will suffer undue or unjust hardship." Pyle suggested that a fair interim solution of the problem of mixed I.F.R. and V.F.R. traffic would "probably involve setting aside a certain block of airspace in the lower altitudes for the smaller planes unequipped for instrument flight and reserving the higher altitudes for I.F.R. operations only."

Jerome Lederer, director of Flight Safety Foundation, Inc., said when he accepted the annual Monsanto Aviation Safety Award from the Aviation Writers Association on May 29: "While air traffic control for the prevention of midair collisions is the most pressing problem that faces aviation, it should not blind us to many others that exist." Lederer noted that despite the frequency with which bad weather contributes to aviation disasters, "The Weather Bureau has had to cut its staff and the weather stations by 25 per cent while aircraft operations have doubled." Crash injury research at Cornell University "is about to go out of existence for lack of funds." Human factors important to aviation safety need more attention; psychological, physiological, and mental problems involving cockpit coordination, ease of operating aircraft, prevention of distraction "still lie largely in the area of informed opinion rather than objective research."

Lederer warned that "the same kind of lethargy" that resulted in failure to take steps to overhaul the air traffic control system prior to 1956 was "now apparent in other fields of aviation safety." The president of United Air Lines, W. A. Patterson, in a letter published by the *Washington Post* on Sept. 10, praised passage of the bill setting up the Federal Aviation Agency but pointed out that the law's enactment in itself would "not solve anything except elimination of divided authorities and responsibilities." The real task of the agency, Patterson implied, will be the "application of experience and judgment to bring about long-range improvements" in aviation safety.